KIRILLOV, ~~I.A.~~, prof.; BORODIN, S.V.,; VINOKUR, R.D.; VOSKRESENSKIY, A.A.; GIROVSKIY, V.F.; ZHITOMIRSKIY, E.G.; SAFRAY, G.Ye.; SYCHEV, N.G.; NIKITIN, N.D.; FILATOV, N.L.; FIALKOVA, V., red.; LEBEDEV, A., tekhn.red.

[Finances of branches of the national economy] Finansy otraslei narodnogo khoziaistva. Avtorskii kollektiv pod rukovodstvom I.A.Kirillova. Moskva, Gosfinizdat, 1958. 302 p. (MIRA 12:2)
(Finance)

KIRILLOV, Ivan Akimovich, prof.. Prinimal uchastiye GIROVSKIY, V.F., dotsent,. VINOKUR, R., otv.red.; FILIPPOVA, E., red.izd-va; LEBEDEV, A., tekhn.red.

[Finances of socialist industry] Finansy sotsialisticheskoi promyshlennosti. Moskva, Gosfinizdat, 1959. 279 p. (MIRA 12:10)

(Finance)

KIRILLOV, I. F.

Kirillov, I. F. "Summer planting of potatoes with freshly-harvested tubers in Tadzhikistan", Byulleten' po plodovodstvu, vinogradarstvu i ovoshchevodstvu, No. 8, 1947, p. 11-90, Bibliog: 18 items.

SO: U-4392 19 August 53, (Letopis 'Zhurnal 'nykh Statey, No 21, 1949).

KIRILLOV I. F.

~~KIRDLLOV~~, I. F.

Kirdllov, I. R.: "Conditions and immediate tasks of winegrowing in the Tadzhik SSR", Byulleten' po plodovodstvu, ovoshchevodstvu i vinogradarstvu, No. 9, 1948, p. 3-19.

SO: U-3042, 11 March 53, (Letopis 'nykh Statey, No. 10, 1949).

KIRILLOV, I.F.

Kul'tura vinograda i ego agrotekhnika v Tadzhikskoi SSR (Cultivation of the grape and its agrotechnology in Tadzhikistan). Stalinabad, Tadzhikgosizdat, 1952. 120 p.

SO: Monthly List of Russian Accessions, Vol. 6, No. 1, April 1953

KIRILLOV, I.F.

"The cultivation of potatoes in Tadzhikistan." Acad Sci Tadzhik SSR. Department of Natural Sciences. Stalinabad, 1956 (Dissertation for the Degree of Candidate in Agricultural Science.)

So: Knizhnaya Letopis', No. 13, 1956

USSR/Cultivated Plants - Potatoes, Vegetables, Melons. M-5

Abs Jour : Ref Zhur - Biol., No 9, 1958, 39292

Author : Kirillov, I.F.
Inst : -
Title : The Agrotechny of Planted Early High Yielding Potatoes

Orig Pub : S-Kh. Tadzhikistana, 1956, No 2, 40-45.

Abstract : The influence of the size of the tubers, of their vernalization, of soil preparation, of timing, and of the methods of planting on the yield of potato crops in Tadjikistan is described. The best results were obtained by utilizing large and average - size vernalized tubers during fall plowing at a depth of 27-30 cm and during spring harrowing. The importance of planting potatoes early and of distributing them in areas of 70 x 70 cm in noted. -- K.V. Popkova

Card 1/1

~~KIRILLOV, L.F.~~; RYBNIKOV, A.A.

The roaring forties. Priroda 52 no.4:42-47 '63. (MIRA 16:4)

1. Gosudarstvennyy okeanograficheskiy institut, Moskva.
(Antarctic regions)

KIRILLOV, I.F.

Using the numerical method for calculating the rise and flow oscillations in the level of the Sea of Azov. Trudy GOIN no.75:43-48 '64. (MIRA 17:10)

KIRILLOV, I. G.

ZASLAVSKIY, Yu.S.; SHOR, G.I.; KIRILLOV, I.G.; LEBEDEVA, F.B.; YEVSTIGNEYEV, Ye.V.; ZLOBIN, O.A.

Using radioactive tracers (tagged atoms) for studying wear properties of lubricants. Trudy VNII NP no.6:58-84 '57. (MIRA 10:10)
(Lubrication and lubricants) (Radioactive tracers)

ZASLOVSKIY, Yu. S.; SHOR, G. I., KIRILLOV, I. G.; LEBEDEVA, F. B.; YEVSTIGNEYEV, Ye. V.; and ZLOBIN, O. A.

"The Application of Radioactive Indicators (Tagged Atoms) in the Investigation ofWear Resistant Properties of Lubricating Oils." p. 58.

in book Study and Use of Petroleum Products, Moscow Gostoptekhizdat, 1957. 213pp.

This collection of articles gives results of scientific research work of the All-Union Scientific Research Inst. for the Processing of Petroleum and Gas for the Production of Synthetic Liquid Fuel.

KIRILLOV, I. I.

"Theory and Design of Steam Turbines," 1947

KIRILLOV, I.

PA 37/49T18

USSR/Engineering — Jul/Aug 48
Turbines, Steam

"Letter to the Editor on Zhiritskiy's Review of Their Book," I. Kirillov, S. Kantor, $\frac{1}{4}$ p

"Kotloturbostroy" No 4

Apology to Zhiritskiy for accidental omission of acknowledgement of use made of Zhiritskiy's work (see 37/49T19).

[redacted] 37/49T18

KIRILLOV, I. I.

"The Force of Social Reaction," Morskoy Flot., No.4, 1948

Chief Scientist, Main Admin. Cadres MMF

APPROVED FOR RELEASE: 09/17/2001 CIA-RDP86-00513R000722620018-3"

KIRILLOV, II.

Gazovye turbiny. Moskva, Mashgiz, 1949. 386 p., diagrs.

"kniga osnovana na kursakh lektsii, chitannykh mnoiu v Leningradskom politekhnicheskom institute." p.3.

Title tr.: Gas turbines. Aviation gas turbines; p.332-344.

SO: Aeronautical Sciences and Aviation in the Soviet Union, Library of Congress, 1955.

KIRILLOV, I.I., professor, laureat Stalinskoy premii, redaktor; LUR'YE, A.I., professor, redaktor; POL'SKAYA, P.G., tekhnicheskiy redaktor.

[Strength of steam turbine elements; a collecion of articles] Prochnost' elementov parovykh turbin; sbornik statei. Moskva, Gos.nauchno-tekhn. izd-vo mashinostroit.lit-ry, 1951. 242 p. [Microfilm] (MLRA 10:4)
(Steam turbines)

KIRILLOV, I. I.

PHASE I TREASURE ISLAND BIBLIOGRAPHICAL REPORT AID 259 - I

BOOK Call No.: AF579436

Author: KIRILLOV, I. I., Professor in the Bezhitsk Institute of Transportation-Machine Construction

Full Title: REGULATING STEAM AND GAS TURBINES

Transliterated Title: Regulirovaniye parovykh i gazovykh turbin

Publishing Data

Originating Agency: None

Publishing House: State Energetics Publishing House (Gosenergoizdat)

Date: 1952 No. pp.: 427 No. of copies: 7,000

Editorial Staff

Editor: None Tech. Ed.: None

Editor-in-Chief: None Appraiser: None

Text Data

Coverage: This book is a further development of the monograph Automatic Devices for Steam Turbines published in 1938 which was a compilation of a number of papers written by the author for engineering-technical courses held by the authors in plants and institutes of the turbine-construction industry. It contains a description of the theory of machine regulating systems and an analysis of applicable governing systems, and of the construction characteristics of basic components of these systems. The statics of governing is described in the first part. The general theory and methods of study of governing processes, and a number of individual governing problems (influence of friction, delays, etc.), are described in the second part. Basic information on governing systems and security devices of contemporary steam turbines are described in the third part. The dynamics of open-type gas turbine governing is shortly described in the fourth part. Diagrams, graphs.

The book is interesting because it contains descriptions of a number of regulators of Russian design, and a number of charts representing tests with these governors.

Purpose: A textbook for students of Institutions of Higher Learning, and also for engineering and technical workers who design and operate steam and gas turbines.

Facilities: A considerable number of Russian scientists, research institutes, and industrial plants are mentioned in the text.

No. of Russian and Slavic References: 25 before 1939, and 41 after this date.

Available: A.I.D., Library of Congress.

KIRILLOV, I.I., doktor tekhnicheskikh nauk, professor.

On the 200th anniversary of the publication of Euler's works on the theory of turbomachines. Trudy Lenh.inst.transp.mashinostr. no.15:3-4 '55. (MLRA 10:2)
(Euler, Leonhard, 1707-1783)

KIRILLOV, I.I., doktor tekhnicheskikh nauk, professor.

Ways of increasing the efficiency of steam turbines. Trudy Besh. inst.transp.mashinostr.no.15:5-10 '55. (MLRA 10:2)
(Steam turbines)

KIRILLOV, I.I., doktor tekhnicheskikh nauk, professor.

Method for designing the flow area of turbines with twisted blades. Trudy Besh.inst.transp.mashinostr. no.15:11-21 '55. (MLRA 10:2)
(Steam turbines)

KIRILLOV, I.I., doktor tekhnicheskikh nauk, professor.

Experimental single-stage air turbine in the turbine laboratory of the Beshitskii Institute of Transportation Machinery Manufacturing. Trudy Besh.inst.transp.mashinostr.no.15:46-50 '55. (MLRA 10:2)
(Air turbines)

KIRILLOV, I.I., doktor tekhnicheskikh nauk, professor.

Effect of initial and final parameters on varying consumption of steam or gas in turbines. Trudy Bezh.inst.transp.mashinostr.no.15: 61-70 '55. (MLRA 10:2)

(Turbines)

KOVALEVSKIY, Mikhail Mikhaylovich; KIRILLOV, I.I., doktor tekhnicheskikh nauk, retsenzent; KARPINSKIY, G.K., inzhener, retsenzent; BITERMAN, B.L., inzhener, redaktor; DUGINA, N.A., tekhnicheskiy redaktor

[Steam turbines; a popular scientific sketch] Parovye turbiny; nauchno-populiarnyi ocherk. Moskva, Gos. nauchno-tekhn. izd-vo mashinostroit. lit-ry, 1956. 102 p. (MLRA 10:2)
(Steam turbines)

26(1) PHASE I BOOK EXPLOITATION SOV/2116

Kirillov, Ivan Ivanovich, Professor (Bezhitsa Institute of Transportation Machinery Manufacturing)

Gazovyye turbiny i gazoturbinnyye ustanovki, tom 2: Gazoturbinnyye ustanovki (Gas Turbines and Gas-Turbine Units, Vol 2: Gas-Turbine Units) Moscow, Mashgiz, 1956. 318 p. Errata slip inserted. 7,000 copies printed.

Reviewers: S. A. Kantor, Professor, and A.A. Kanayev, Candidate of Technical Sciences; Ed.: R.M. Yablonik, Candidate of Technical Sciences; Tech. Ed.: B.I. Model'; Managing Ed. for Literature on Transportation Road, and Power Machinery Manufacturing: G.I. Petrov, Engineer.

PURPOSE: This is a textbook approved by the Main Administration of Polytechnic and Mechanical Engineering Vuzes for students of mechanical engineering vuzes. It may also be useful to engineers designing gas-turbine units.

COVERAGE: This second volume of the author's monograph on gas turbines contains basic information on the work of a gas-turbine unit. It is supposed that the reader is familiar with elementary problems of the theory of turbomachines. The book deals primarily with the investigation of the thermodynamics of gas-turbine units, their operation under various conditions and their regulation.

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Gas Turbines and Gas-Turbine Units

A brief analysis and description of the basic types of stationary and mobile gas-turbine units are given. Special consideration is given to light gas-turbine units. Turbojet engines are mentioned only briefly as one of the examples of light gas-turbine power units. Some consideration is given to heat-exchange apparatus. No personalities are mentioned. There are 67 references: 33 Soviet, 27 English and 7 German.

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Gas-Trubines and Gas-Turbine Units

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PART III. GAS-TURBINE UNITS

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Gas-Turbines and Gas-Turbine Units

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Card 8/8

KIRILLOV, I.I., professor; KANTOR, S.A., professor, retsenzent; KANAYEV, A.A., kandidat tekhnicheskikh nauk; retsenzent; YABLONIK, R.M., kandidat tekhnicheskikh nauk, redaktor; MODEL' B.I., tekhnicheskiy redaktor.

[Gas turbines and gas turbines installations]Gazovye turbiny i gazoturbinnye ustanovki. Moskva, Gos.nauchno-tekhn.izd-vo mashinostroit. lit-ry. Vol.1.[Gas turbines and compressors] Gazovye turbiny i kompressory. 1956. 434 p. (MLRA 9:6)

1.Bezhitskiy institut transportnogo mashinostroyeniya (for Kirillov).

(Gas turbines)

KIRILLOV, I.I.

KANAYEV, Andrey Andreyevich; IOFFE, A.F., akademik, retsenzent; KIRILLOV, I.I., professor, doktor tekhnicheskikh nauk, redaktor; STEPANCHENKO, N.S., redaktor izdatel'stva; TIKHANOV, A.Ya., tekhnicheskiy redaktor

[From water mill to atomic engine] Ot vodianoi mel'nitsy do atomnogo dvigatelia. Izd. 2-oe, dop. Moskva, Gos.nauchno-tekhn., izd-vo mashinostroit. lit-ry, 1957. 231 p. (MLRA 10:9)
(Engines)

312

AUTHOR: Kirillov, I.I., Professor, Doctor of Technical Sciences and Yablonik, R.M., Candidate of Technical Sciences.

TITLE: The influence of closed axial gaps on the efficiency of active type stages with cylindrical blades. (Vliyaniye zakrytogo osevogo zazora na k.p.d. stupeney aktivnogo tipa s tsilindricheskimi lopatkami.)

PERIODICAL: "Energomashinostroenie", (Power Machinery Construction), 1957, No. 5, pp. 15 - 18, (U.S.S.R.)

ABSTRACT: Until recently, small closed axial gaps have been used in active type stages of steam turbines and sometimes also in gas turbines. Numerous experiments carried out in the Bryansk Institute of Transport Engineering as well as theoretical considerations show that the application of quite long closed axial gaps in active type stages can be very useful in increasing both the reliability of the blading and the stage efficiency. The gaps are classified as follows: a front open axial gap between the edge of the shroud and the body of the diaphragm, the back open axial gap, the closed axial gap bounded by the cylindrical solid wall of the fixed diaphragm and the closed axial gap formed by the overhang of the shroud. Another important gap is that between the outlet edges of the guide vanes and the inlet edges of the working blades. This gap and the closed axial gap bounded by the cylindrical walls are the subject of this article. Investigations on stationary

The influence of closed axial gaps on the efficiency of active type stages with cylindrical blades. (Cont.)

blading were made long ago, and the existing situation is reviewed. These were concerned only with profile energy losses and did not allow for friction on the walls bounding the closed axial gap. In a turbine stage there are a number of effects additional to those that occur in stationary blading which can cause vital changes in the energy losses. The most important special features introduced by rotation of the rotor are considered, and a formula is derived for the pressure drop due to friction in a closed axial gap. From this a formula is derived for the influence of the degree of reaction on the energy loss by friction in the closed gap. From this formula, it follows, for example, that when the degree of reaction is 0.5, the friction losses related to the total heat drop are only half those when there is no reaction. In order to give some idea of the magnitude of the efficiency changes under the influence of a closed axial gap, examples are given of tests on models of active type turbine stages with different heights and blade profiles. The tests were made on experimental turbines operating on air. Curves are given of the efficiency for various lengths of closed axial gaps. As the length of the closed axial gap is increased the curves become somewhat flatte Similar tests are made with various blade designs. From the experimental results and the theoretical considerations that accompany them it follows that it is advantageous to make the closed axial gaps relatively great for stages with both relatively short and relatively long blades. Taking into account that for stages with long blades the positive influence of increasing the axial gap in equalising the forces acting on the blades assumes special importance the value of using long closed axial gaps which simultaneously increase the efficiency becomes evident.

On the other hand as the closed axial gap is increased there is a change in the structure of the flow and in the field of pressure before the working wheel and, because of this, there are also changes in the leakage of steam through the open axial gap. The influence of various design factors on steam leakage is explained.

Some tests were made with very large closed gaps (above 100 mms) in order to get some idea of the friction. In this region, the influence of flow equalisation becomes negligibly small. The results of the tests are shown in the graphs. The experiments carried out make it possible to evaluate approximately the energy losses due to operation of the blading in a non-uniform flow.

The following practical conclusions are drawn from the work. At the present time in designing active type stages of steam turbines the distances between the edges of the guide

The influence of closed axial gaps on the efficiency of active type stages with cylindrical blades. (Cont.)

and working blading are often made small. Numerous tests that have been carried out show that it is advisable to use comparatively large axial gaps. The tests established that as the length of the closed axial gap is increased, provided that the blading is long enough, the efficiency first increases considerably, then reaches a maximum and then slowly falls. The length of closed axial gap should, therefore, be selected at not less than the value corresponding to maximum efficiency as shown in the experimental data. The increase in efficiency associated with equalisation of the flow and, with sufficiently long blading, the maximum efficiency, are in the regions where the flow is well equalised. Therefore, the selection of a large closed axial gap leads not only to some increase in the stage efficiency but also increases the reliability of the turbine reducing the probability of blade vibration. From this point of view, with long blading it may be advisable to select a closed axial gap somewhat longer than the optimum value from the standpoint of efficiency. It is particularly advisable to use long closed axial gaps in turbines with a wide range of speed, for instance in marine turbines and in turbines for driving blowers, since when the stages operate with large angles of attack the gain in efficiency from the application of long axial gaps increases. Besides, for turbines of this type, the selection of long axial gaps is also very useful from the point of view of blading strength. 8 figures, 5 literature references. (3 Russian).

10(2) PHASE I BOOK EXPLOITATION SOV/1308

Kirillov, Ivan Ivanovich, Rakhmiyel' Mordukhovich Yablonik, Lev Vasil'yevich Kartsev, Ivan Grigor'yevich Gogolev, Ryurik Vladimirovich Kuz'michev, Gennadiy Ivanovich Khutskiy, Rostislav Ivanovich D'yakonov, Viktor Dmitriyevich Pshenichnyy, and Aleksandr Aleksandrovich Tereshkov

Aerodinamika protochnoy chasti parovykh i gazovykh turbin (Aerodynamics of Steam and Gas Turbine Flow-Passage Areas) Moscow, Mashgiz, 1958. 246 p. 4,500 copies printed.

Ed.: Kirillov, I.I., Professor, Bryansk Institut of Transport Machine Building; Reviewer: Shubenko, L.A., Corresponding Member, USSR Academy of Sciences; Tech. Ed.: Gerasimova, D.S.; Managing Ed. for Literature on General Technical and Transport Machine Building (Mashgiz): Ponomareva, K.A., Engineer.

PURPOSE: This book was written for engineers working on the design,

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manufacture and operation of steam and gas turbines. It may also be useful to students of special courses.

COVERAGE: The authors analyze physical phenomena connected with flow through the stages of impulse steam and gas turbines. They give the results of experimental investigation of stages with full and partial supply of the working medium. The basic results obtained are for high - and medium-powered turbines. Results of the investigation of a new low-powered turbine are also given. Practical recommendations for the design of the flow passage area of steam and gas turbines are given, based on the investigation of effect of various design measures on the efficiency coefficient of stages. The investigation was made in the BITM (Bryansk Institute of Transport Machinery Building). The following sections were written by members of the Chair of Turbine Construction of the BITM: Professor I.I. Kirillov, Docent, Candidate of Technical Sciences, paragraphs 1, 2, 13, 16; Docent

R.M. Yablonik, Candidate of Technical Sciences, paragraph 9; I.I. Kirillov and R.M. Yablonik, paragraphs 3, 4, 5; L.V. Kartsev, Candidate of Technical Sciences, paragraphs 6, 7, 19; L.V. Gogolev, Candidate of Technical Sciences, paragraphs 10, 11; R.V. Kuz'michev, Candidate of Technical Sciences, paragraph 8; G.I. Khutskiy, Candidate of Technical Science, paragraphs 12, 14, 15; R.I. D'yakonov, paragraph 17; V.D. Pshenichnyy, Engineer of the Kirov Plant, paragraph 18; A.A. Tereshkov, Engineer of BITM, paragraph 20. The Leningrad Metal Plant, Khar'kov Turbine Plant, Kabush Turbine Plant and Leningrad-Kirov Plant contributed to the development of experimental works on turbines for BITM. The bibliography consists of 23 references, 22 of which are Soviet, and 1 is German.

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Aerodynamics of Steam and Gas Turbine Flow-Passage Areas SOV/1308

AVAILABLE: Library of Congress

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SOV/96-58-11-21/21

AUTHOR: Kirillov, I.I., Doctor of Technical Science

TITLE: Concerning S.A.Aksyutin's Book 'The Future Development of Steam and Gas-Turbine Electric Power Stations' Mashgiz, 1957 (O knige S.A.Aksyutina 'Perspektivy razvitiya parovykh i gazovykh turbin elektricheskikh stantsiy', Mashgiz, 1957. 219 str.)

PERIODICAL: Teploenergetika, 1958, Nr 11, pp 94-96 (USSR)

ABSTRACT: The general criticism, that the book has an academic approach, is supported by a number of examples. Several errors in the book are pointed out.

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8(6) SOV/143-58-11-15/16

AUTHORS: Kirillov, I.I., Doctor of Technical Sciences, Professor, Kirillov, A.I.

TITLE: The Influence of Experimental Turbine Vibration on the Test Accuracy

PERIODICAL: Izvestiya vysshikh uchebnykh zavedeniy, Energetika, 1958, Nr 11, pp 116-125 (USSR)

ABSTRACT: The rapid development of power engineering in the USSR requires experiments for improving the flow area of different turbine designs. Contemporary requirements for the accuracy of aerodynamic experiments are very high. Deviations of test data obtained by using the same experimental unit often cannot be explained by errors of the aerodynamic and other instruments used for the experiments. These differences reduce the confidence in utilizing experimental data which decreases the effectiveness of the very important and complicated experimental work. At BITM those physical phenomena on experimental turbines were investigated which may cause errors in the test results and which frequent-

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The Influence of Experimental Turbine Vibration on the Test Accuracy

ly escape the attention of the experimental investigator. The explanation of mechanical vibration losses is a part of this investigation. The influence of such losses cannot be avoided completely and sometimes it attains a considerable importance, since experimental turbines work in a wide range of velocities and are equipped with numerous devices having different self-oscillation frequencies. The authors present in this paper some theoretical considerations and results of special experiments explaining the origination and possible magnitude of mechanical energy losses caused by vibrations of the experimental turbine. Without going into details with explaining types of experimental turbines, the authors investigate a very simple system which is common to all machines. It consists of a rotor with the working wheels at one end and the braking device at the other one, a casing with the bearings and a dashpot, as shown in figure 1. The authors then investigate the useful turbine energy dissipation during oscillations. Inadequate balancing

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The Influence of Experimental Turbine Vibration on the Test Accuracy

and centering of the rotor, beating of the hydraulic brake disc and other defects in the experimental unit may cause considerable forced oscillations of machine elements and foundations. The authors present formulae and equations for calculating the work spent for these oscillations. They point out that the accuracy of balancing is of great importance. At BITM an experimental unit was built for determining the power measurement errors caused by vibration. An electric motor is used for turning the experimental turbine rotor, as shown in figure 3. The electric motor stator was placed in ball bearings. The moment developed at the shaft of the motor was measured. The friction in each of the turbine bearings was measured by means of floating bushings. The vibrations were caused by artificially unbalancing of the rotor by adding small weights. The results of this test are shown in figure 4. The mechanical losses in the bearings of experimental turbines were determined at BTM by floating bushings, into which the races of the ball

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bearings of the turbine shaft were installed, as shown in figure 6. At an oil pressure of 3-4 kg/cm^2, these bushings begin to float and the friction moment in the bearings is measured by means of balances [Ref 1]. It was established that under certain vibration conditions a negative friction moment is observed and the measurements of friction losses in the bearings become unreliable. Investigations showed the friction moment in the bearings may be measured with adequate accuracy, provided the floating bushings do not touch the walls of the casing. Strong vibrations may cause a seizing of the bushings in the casing and will cause errors of friction moment measurements. The authors arrive at the following conclusion: 1) Vibration of experimental turbines are connected with an additional resistance moment, originating at the shaft, which is not measured by the brake. The magnitude of the error caused by the additional friction moment may attain considerable values, especially in stages with short blades and with partial admission of the

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The Influence of Experimental Turbine Vibration on the Test Accuracy

working medium. The error may be essential with a great temperature drop at the turbine, regardless to a considerable power of the experimental turbine. 2) The magnitude of the experimental error will be especially large with small dimensions of the model. Extraordinary careful balancing is required for small models. 3) Some devergances of the experimental results with analogous stages on different experimental turbines may be explained by an underestimation of the energy dissipation caused by vibration. There are 2 diagrams, 1 photograph, 3 graphs and 3 Soviet references.

ASSOCIATION: Bryanskiy institut transportnogo mashinostroyeniya (Bryansk Institute of Transport Machine Building) (Kafedra turbostroyeniya (Chair of Turbine Building)

SUBMITTED: September 21, 1958

Card 5/5

POVKH, Ivan Lukich; Prinimal uchastiye: SMIRNOV, G.V., inzh.. KIRILLOV, I.I., prof., doktor tekhn.nauk, retsenzent; BOGDANOVA, V.V., kand.fiz.-mat.nauk, red.; SIMONOVSKIY, N.Z., red.izd-va; DUDUSOVA, G.A., red.izd-va; SHCHETININA, L.V., tekhn.red.

[Aerodynamic experiments in mechanical engineering] Aerodinamicheskii eksperiment v mashinostroenii. Moskva, Gos.nauchno-tekhn. izd-vo mashinostr.lit-ry, 1959. 394 p. (MIRA 12:9)
(Aerodynamics) (Mechanical engineering)

8(6)

SOV/143-59-2-13/19

AUTHORS: Kirillov, I.I., Professor, Doctor of Technical Sciences, and Kuz'michev, R.V., Candidate of Technical Sciences

TITLE: The Influence of the Angle of Rotation of the Guide Blades on the Efficiency and the Degree of Reactivity of a Turbine Stage (Vliyaniye na k.p.d. i na stepen' reaktivnosti turbinnoy stupeni ugla povorota napravlyayushchikh lopatok)

PERIODICAL: Izvestiya vysshikh uchebnykh zavedeniy - Energetika, 1959, Nr 2, pp 101-110 (USSR)

ABSTRACT: A small turn of the guide blades of a turbine stage changes the characteristic of the latter to a considerable extent and it is used for this purpose in practice. Thereby, the change of the degree of reactivity has a great influence on the performance of a turbine stage. Applying the rotation of guide blades, the designer must have the possibility to estimate the losses of energy connected with such a turn and must be able to determine the degree of

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reactivity. In the available literature, there are very few experimental data, required for such calculations. For this reason, at BITM-Bryanskiy institut transportnogo mashinostroyeniya (Bryansk Institute of Transportation Machine Building) a series of experiments were performed on gas turbine stages with different guide blade angles of rotation and unchanged rotor blade position. These experiments characterize the influence of the angle of rotation of the guide blades and may be used to evaluate the influence of the degree of reactivity on the efficiency factor of the turbine stage. The principal dimensions of the experimental stage are shown by figure 1. The d/l ratio was approximately 8. The rotor and the guide blades had the profiles of the Leningradskiy metallicheskiy zavod (Leningrad Metals Plant). The basic stage had an outlet angle of the stationary blading of $\alpha_1 \approx 17^{\circ}$. Five modifications were obtained from this basic stage

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The Influence of the Angle of Rotation of the Guide Blades on the Efficiency and the Degree of Reactivity of a Turbine Stage

having angles α, 14, 15, 16, 18 and 19° and were designated according to the angle values by numbers 14 + 19. The experiments were performed with a single-stage experimental air turbine. Figure 2 shows the system of measurements used. The methods of the BITM [Ref 1] were used for obtaining and processing the experimental data. Besides measuring the conventional parameters, the pressure in the axial clearance between the rotor and the stationary blading was measured. The experiments showed that the energy loss factors, changes by 0.2% when shifting the guide blading by 14 + 19°. The authors present the investigation results for the efficiency factor, the degree of reactivity and the influence of the latter on the energy losses within the stage. The authors come to the following conclusions: 1) With great flow outlet angles, a turn of the blades by several degrees will cause an insignificant change of the profile energy losses in the guide

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blades. 2) A small turn of the guide blades causes, at an optimum value of $\frac{u}{C_o}$, a comparatively small change of the turbine stage efficiency factor η', which was calculated under consideration of losses of kinetic outlet energy. The efficiency factor, calculated under the consideration of using the kinetic outlet energy, changes with a turn of the guide blades to a greater extent. 3) When turning the guide blades, considerable energy losses occur under the influence of the angles of attack. 4) Increased degrees of reactivity of a turbine stage are connected with a considerable decrease of profile energy losses in the rotor, especially in the areas of negative degrees of reactivity. There are 2 diagrams, 11 graphs, 2 tables and 1 Soviet reference.

SOV/143-59-2-13/19

The Influence of the Angle of Rotation of the Guide Blades on the Efficiency and the Degree of Reactivity of a Turbine Stage

ASSOCIATION: Bryanskiy institut transportnogo mashinostroyeniya (Bryansk Institute of Transportation Machine Building)

PRESENTED: Kafedra turbostroyeniya (Chair of Turbine Building)

SUBMITTED: November 18, 1958

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8(6)

SOV/143-59-12-10/21

AUTHOR: Kirillov, I.I., Professor, Doctor of Technical Sciences

TITLE: An Equation of the Radial Balance for a Turbine Stage

PERIODICAL: Izvestiya vysshikh uchebnykh zavedeniy: Energetika, 1959, Nr 12, pp 73-76 (USSR)

ABSTRACT: The author gives some propositions on an equation for the radial balance of the flow moving behind the directing apparatus and the runner. He proceeds from the equation for balance:

$$\frac{dp}{dr} = -\rho\frac{c_u^2}{r} - \rho\frac{dc_r}{dt} \qquad (1)$$

where r is the radius of the respective circle; p and ρ - the pressure and density respectively of the gas or steam; t - time; $\frac{dc_r}{dt}$ - radial acceleration. Derived from this is the final differential equation:

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$$\frac{dc_{1z}^2}{dr} = \frac{c_{1u}}{c_{2u}} \frac{dc_{2z}^2}{dr} \quad (6)$$

When stages with uneven axial speeds behind the runner are being evaluated, power losses caused by levelling in the acceleration field must be taken into account. If the axial speed component in front of the working wheel diminishes from the root to the periphery of the stage, then an increase in the axial speed of the flow takes place behind the wheel. There are 2 diagrams and 3 references, 1 of which is English and 2 Soviet.

ASSOCIATION: Bryanskiy institut transportnogo mashinostroyeniya (Bryansk Institute for Transport Machine Construction)

SUBMITTED: August 17, 1959, by the Kafedra turbostroyeniya (Chair of Turbine Construction)

KIRILLOV, I.I., doktor tekhn.nauk prof.; KUZ'MICHEV, R.V., kand.tekhn. nauk

Effect of leakages on the selection of the reactivity degree of the turbine stage. Izv.vys.ucheb.zav.; energ. 2 no.6:55-60 Je '59. (MIRA 13:2)

1. Bryanskiy institut transportnogo mashinostroyeniya. Predstavlena kafedroy turbostroyeniya.
(Turbines)

KIRILLOV, I., inzh.; PASHKOV, N., inzh.; SOLOV'YEV, V., inzh.; KAREV, I.

Readers' comments on V.S.Bondarenko's article "Improve the inspection of boiler units." Bezop.truda v prom 3 no.9: 23-24 S '59. (MIRA 13:2)

1. Upravleniye Severo-Zapadnogo okruga Gosgortekhnadzora RSFSR (for Kirillov, Pashkov, Solov'yev). 2. Zamestitel' predsedatelya Komiteta Gosgortekhnadzora Azerbaydzhanskoy SSR (for Karev).
(Boiler inspection) (Bondarenko, V.S.)

30241

S/145/60/000/002/009/020
D221/D302

26.2122

AUTHOR: Kirillov, I.I., Doctor of Technical Sciences, Professor

TITLE: Experimental investigation of gas turbine stages with different degrees of reaction and variable α

PERIODICAL: Izvestiya vysshikh uchebnykh zavedeniy. Mashinostroyeniye, no. 2, 1960, 88 - 97

TEXT: A description is given of experiments on the rational selection of the degree of reaction for different work conditions of turbines, and made with different exit angles α_1. The degree of reaction was calculated as the ratio of thermal drop of potential in the rotor to the total drop in the stage, and it showed an increase from -0.6 to +0.14. Changes in α_1 produced significant incidence angles of flow past the blades which were not modified, whereas during design this can be taken into consideration. The coefficient of efficiency exhibited a fall with the reduction in the degree of reaction. Experiments were carried out with a con-
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Experimental investigation of ... S/145/60/000/002/009/020 D221/D302

stant height of blades. In actual design, these are also varied with the angle α_1 as the gas flow remains approximately unaltered. Reduction of reaction loweres the coefficient of efficiency, when higher blades produce an improvement. Tests on models (A and B) were made in order to compare the efficiencies of stages. Rotor blades of both had the same profiles, and results were almost identical. Comparison with models of different root diameters, but with equal height of blades indicated a drop of efficiency for lower reaction which had a greaterrate than in the case of changed angle α_1. Two models with a higher ratio of reaction (D and C) were then tested. The optimum coefficient of efficiency was obtained with a larger ratio of reaction, and the curve was steeper. The anlge of flow in turbine C was greater than in D, and this caused additional loss of power. When considering results of experiments, special attention was drawn to the degree of reaction in the root section; although other sections are also important. However, the stream has a greater turning near the root section of the rotor, where maximum losses are incurred. The examination demonstrated

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S/145/60/000/002/009/020
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Experimental investigation of ...

that an increase of reaction in the negative region improves stage efficiency. No break of flow was observed in that zone even at a low ratio of reaction. The stability is explained by rapid increase of reaction with a rise of radius, and by the fact that more distant layers of flow deliver kinetic energy to the gas which passes through the diffusor part of the channel. Centrifugal forces in the boundary layer produced by rotation of a wheel also have a favorable effect. Operation of a stage with a small positive or a negative ratio of reaction has advantages, because its root diameter is reduced, or the worked thermal potential is higher. This gives ground for continuing the work on improving stages with a low ratio of reaction. The latter method should not be used when rotors have unloading holes which may produce an opposite flow of gas. The author considers that in the case of two-shaft gas turbines it is expedient to use slewed guide blades in the upstream of the main turbine, when operating at part loads. The latter cause an increase of temperature which improves efficiency. Experiments proved that 1 - 2^{o} turning of blades from the position of optimum conditions produces only a small deterioration of efficiency.

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D221/D302

There are 9 figures and 4 Soviet-bloc references.

ASSOCIATION: Bryanskiy institut transportnogo mashinostroyeniya (Bryansk Institute of Transport Engineering)

SUBMITTED: December 15, 1959

X

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83850

S/114/60/000/009/001/007
E191/E481

26.2120

AUTHORS: ~~Kirillov, I.I.,~~ Doctor of Technical Sciences, Professor and Kirillov, A.I., Engineer

TITLE: Turbine Stages Which Develop a Large Starting Torque

PERIODICAL: Energomashinostroyeniye, 1960, No.9, pp.6-8

TEXT: In gas turbine plants for traction applications, a turbine with a large starting torque can simplify the transmission of the main drive and thereby significantly improve the efficiency and reduce the cost of the entire installation. Some analytical derivations and tests carried out at the Bryansk Institute of Transport Machinery (Bryanskiy institut transportnogo mashinostroyeniya) are reported which illustrate the possibilities of greatly increasing the starting torque in stages especially designed to this end and thus deviating from other optima under operating design conditions. The factor by which the starting torque exceeds the operating torque under design conditions can be calculated in the first approximation assuming an unchanged gas mass flow and becomes a function of the circulation coefficient only. Tests have shown that the measured starting torque is higher than the values so calculated and it is necessary to study the flow through

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S/114/60/000/009/001/007
E191/E481

Turbine Stages Which Develop a Large Starting Torque

blade cascades at very large incidences. Tests of a plane cascade of rotor blades were carried out at a Reynolds number of 250000 and a Mach number of 0.2. The main object was the evaluation of very large positive incidences on the profile losses in the cascade and on the outlet angle. With a rising incidence, starting from 20°, the velocity coefficient drops sharply. In the beginning of this region, the kinetic energy of the impinging flow is still large and the cascade losses are increased. When the inlet angle approaches 90°, the relative magnitude of the inlet kinetic energy falls to a minimum because the free cross-section becomes a maximum. The rate of decrease of the velocity coefficient becomes smaller. The outlet angle on the other hand remains almost constant between zero incidence and an incidence of about 80°. The outlet angle slightly diminishes with a further increase of incidence. Tests of two succeeding plane cascades, simulating the stator and rotor blades, have shown that, by increasing the axial clearance between the cascades, the energy losses can be reduced. In annular cascades, the pressure distribution is different and the effect of the axial clearances

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S/114/60/000/009/001/007
E191/E481

Turbine Stages Which Develop a Large Starting Torque

requires further investigation. The preliminary tests so far reported indicate the possibility of designing gas turbines for transport application with a high starting torque. As shown by the tests, the high incidences occurring at standstill are compatible with satisfactory continuous operation of the stage. The large resistance of the cascades at standstill causes an increase in the degree of reaction which determines the mass flow through the turbine. There are 7 figures and 3 Soviet references.

X

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KIRILLOV, I.I., doktor tekhn.nauk

Deviation from the criterion of static autonomy in systems controlling several values. Teploenergetika 7 no.9:49-55 S '60. (MIRA 14:9)

1. Bryanskiy institut transportnogo mashinostroyeniya.
(Steam turbines)

26.2194

20308
S/143/60/000/010/006/011
A189/A026

AUTHOR: Kirillov, I. I., Doctor of Technical Sciences, Professor

TITLE: Investigation of the control dynamics of turbines with intermediate steam superheating using a frequency method

PERIODICAL: Energetika, no. 10, 1960, 53-66

TEXT: The author investigates the influence of the intermediate reheating stage upon the stability and transient response of the turbine control system. The investigation is carried out with the use of a frequency method described by Professor V. V. Solodovnikov in (Ref. 3: Osnovy avtomaticheskogo regulirovaniya (Principles of Automatic Control), Mashgiz, 1954). The block diagram of the turbine control system, shown in Figure 1, is transformed to include an equivalent link M representing the volume of the intermediate reheating stage. The theoretical analysis of this control system indicates that an improvement of the control stability can be obtained with a large volume of the intermediate reheating stage. In many cases, the least favorable operating conditions for control stability exist at small turbine loads. Figure 3 shows frequency response of the equivalent intermediate

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A189/A026

Investigation of the control dynamics...

volume. Figure 6 shows the real frequency response of a closed-loop control system relative to the perturbing action. Figure 7 shows the transient control response of this system. There are 7 figures and 3 Soviet references.

ASSOCIATION: Bryanskiy institut transportnogo mashinostroyeniya (Bryansk Institute of Transportation Machinery)

PRESENTED: Kafedra turbinostroyeniya (Department of Turbine Building)

SUBMITTED: June 11, 1960

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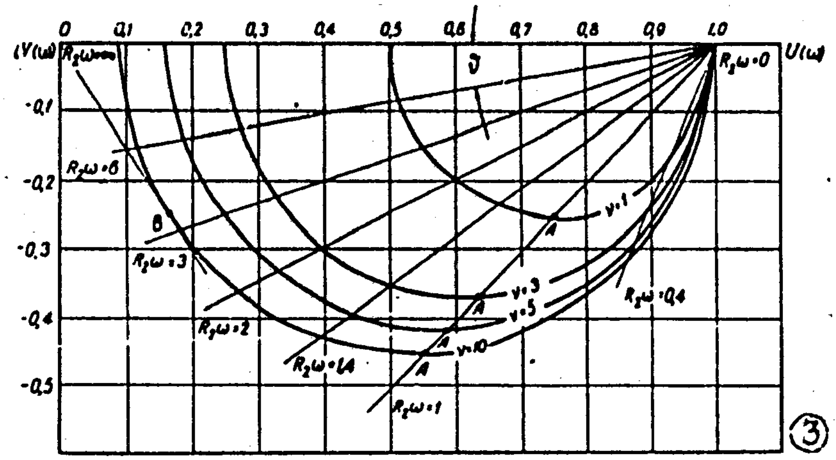

Figure 3: Frequency response of equivalent intermediate volume

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S/143/60/000/010/006/011
A189/A026

Investigation of the control dynamics...

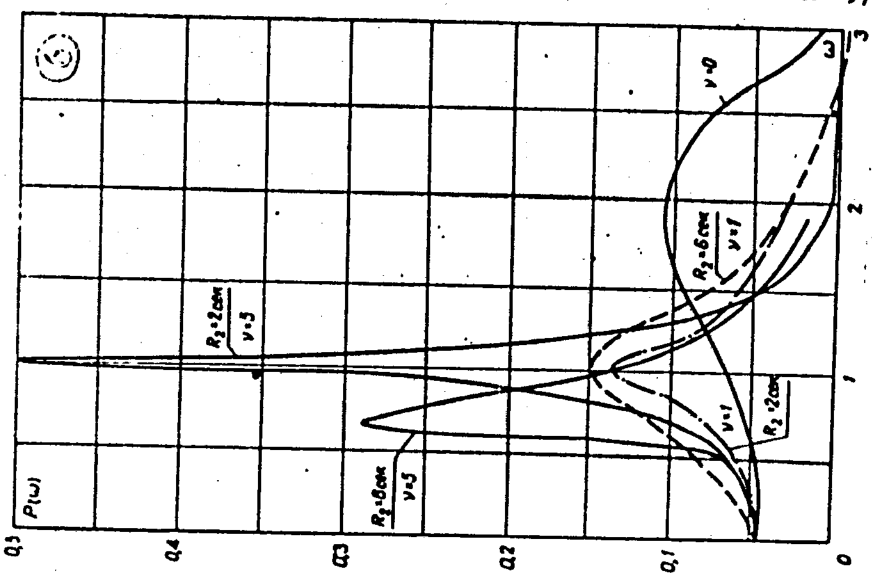

Figure 6:
Real frequency response of closed-loop control system

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S/143/60/000/010/006/011
A189/A026

Investigation of the control dynamics...

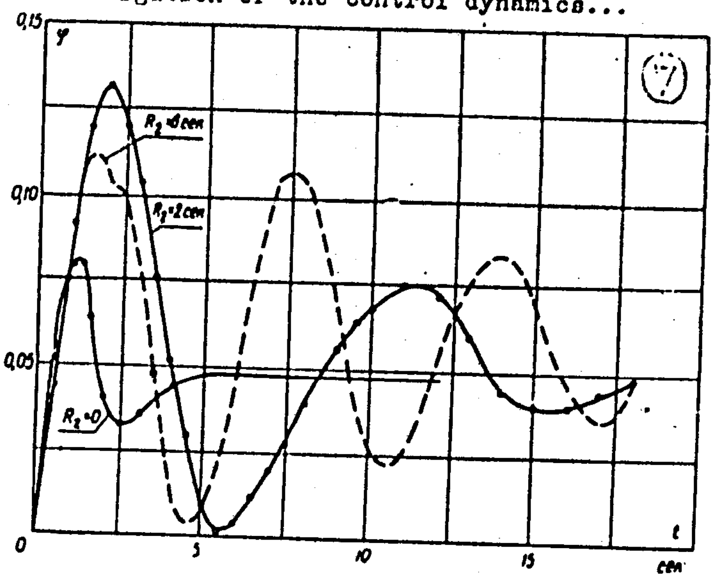

Figure 7: Transient control response

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PHASE I BOOK EXPLOITATION SOV/5756

Kirillov, Ivan Ivanovich

Avtomaticheskoye regulirovaniye parovykh i gazovykh turbin (Automatic Control of Steam and Gas Turbines) Moscow, Mashgiz, 1961. 599 p. Errata slip inserted. 7000 copies printed.

Reviewer: S.P. Kuvshinnikov, Engineer; Ed.: N.L. Raykhel', Candidate of Technical Sciences; Ed. of Publishing House: A.A. Basentsyan; Tech. Ed.: T.F. Sokolova; Managing Ed. for Literature on Heat Energy, Metallurgy, Highway Construction, and Hoisting and Transporting Machinery Construction: G.I. Baydakov, Engineer.

PURPOSE: This book is intended for engineers concerned with the investigation, design, and operation of steam and gas turbines and other types of turbomachinery. The book may also be useful to students taking courses in turbomachine control at schools of higher education.

COVERAGE: The book gives a systematic presentation of the theory of steam- and gas-turbine control, analyzes modern control systems, and discusses special

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design features of the elements of these systems. Particular attention is given to problems of control dynamics. Many problems in the dynamics of steam and gas turbine control are investigated with the aid of frequency characteristics. No personalities are mentioned. There are 135 references: 127 Soviet, 6 German, and 2 English.

TABLE OF CONTENTS:

KIRILLOV, I.I.

Air curtains of industrial enterprises. Vod. i san. tekh. no.1: 27-29 Ja '61. (MIRA 14:9)

(Air curtains)

30284

S/096/61/000/012/001/003
E194/E155

26.2120

AUTHORS: Kirillov, I.I., Doctor of Technical Sciences, and
Tereshkov, A.A., Engineer

TITLE: Turbine stage having guide channels with flat walls

PERIODICAL: Teploenergetika, no.12, 1961, 45-51

TEXT: A turbine stage in which the surfaces bounding the guide vanes are cylindrical has the disadvantage of relatively high energy loss at the stage roots because of flow over a curved surface, and leakage of working substance through the periphery of the open axial gap. Stages of this type are termed cylindrical. Other stages which have long been used have the guide vane ducts bounded at the root and periphery by flat surfaces, usually produced by straight milling of the blades. These will be termed flat-ended stages; the flow in them is guided by the flat ends of the blades and so their characteristics differ from those of cylindrical stages. For example, in theory one would expect a constant degree of reaction along the blade radius. Work was undertaken at the Bryanskiy institut transportnogo mashinostroyeniya (Bryansk Institute of Transport Engineering) (BITM) to compare the

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Turbine stage having guide channels ... S/096/61/000/012/001/003
E194/E155

characteristics of cylindrical and flat-ended stages, with blades of medium height. The stages are illustrated diagrammatically in Fig.1, where the uppermost diagram (a) shows the flow path, which was used in all cases. The diagram б shows a model 2 guide vane and the diagram в gives two views of the model 2 guide-blade arrangement. Model 1 was a cylindrical stage, not illustrated, in which the top and bottom of the guide vanes were cylindrical, whilst, as will be seen from the diagram, in model 2 the guide blades had plane-parallel ends. All the models used the same rotor with strip shrouding. Both models used the same blade profile. The tests were made on a single-stage air turbine with conditions of $M_{c1} \approx 0.33$ and $Re_{c1} \approx 4.5 \times 10^5$. Each model was tested with several values of open axial clearance δ_1 in the range 0.5-5 mm, in order to assess the influence of the leakage of working substance through the peripheral axial gap. Efficiency curves are given in Fig.2; the curves in Fig.2a relate to Model 1 and those in Fig.2б to Model 2. Fig.3 shows reaction curves at the root (ρ') and at the periphery (ρ) as functions of the velocity ratio u/C_0 for various values of clearance δ_1. The dotted lines
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Turbine stage having guide channels ... S/096/61/000/012/001/003
E194/E155

relate to Model 1 and the bold lines to Model 2. Model 1 has normal characteristics for an active type stage with untwisted blades. Model 2 has very different characteristics; the degree of reaction is almost constant over the height of the flow path, as would be expected from theoretical considerations. This is true over the whole range of speed and clearances studied. The degree of reaction on the mean radius of Model 2 was much less than for Model 1, particularly for small axial clearances. The efficiency curves for Model 2 are also very different from those for Model 1. In particular, the efficiency of Model 2 is higher, both when the clearance δ_1 is big and when it is small. Flow, pressure and speed measurements across the stages showed that the distribution was uneven in both models, but more even in Model 2 than in Model 1; the kinetic energy of discharge was also lower. With Model 2 the leakage of working substance through the open axial gap is lower, because of the reduced reaction at the peripheral section. Moreover, the degree of reaction at the mean section can be lower than with Model 1, and this has the usual advantages.
There are 7 figures and 5 Soviet-bloc references.

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X

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Turbine stage having guide channels ... S/096/61/000/012/001/003
E194/E155

ASSOCIATION: Leningradskiy politekhnicheskiy institut
(Leningrad Polytechnical Institute)

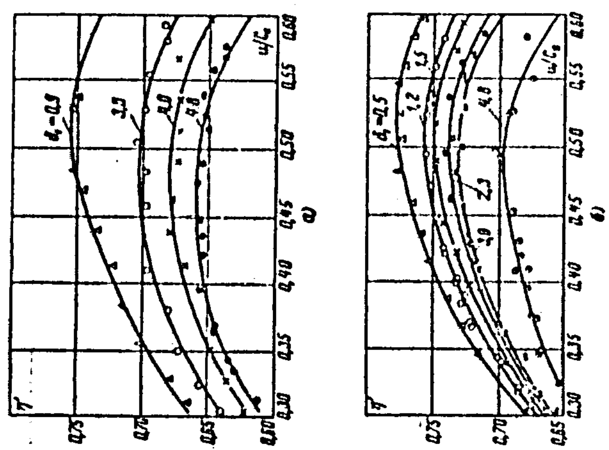

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Fig.2

KIRILLOV, I.I., doktor tekhn.nauk, prof.; GOGOLEV, I.G., kand.tekhn.nauk, dotsent; D'YAKONOV, R.I., kand.tekhn.nauk; KLIMTSOV, A.A., inzh.

Aerodynamic study of the outlet nozzle of a gas turbine. Izv. vys. ucheb. zav.; energ. 4 no.8:56-59 Ag '61. (MIRA 14:8)

1. Bryanskiy institut transportnogo mashinostroyeniya. Predstavlena kafedroy turbostroyeniya.

(Gas turbines)

KIRILLOV, I.I., doktor tekhn.nauk, prof.; IVANOV, V.A., inzh.

Frequency analysis of a certain class of equivalent links. Izv. vys. ucheb. zav.; energ. 4 no.10:60-67 O '61. (MIRA 14:11)

1. Leningradskiy politekhnicheskiy institut imeni M.I.Kalinina. Predstavlena kafedroy turbinostroyeniya.

(Automatic control)

KIRILLOV, I.I., doktor tekhn.nauk,prof.; YABLONIK, R.M., kand.tekhn.nauk, dotsent

Characteristics of turbine stages at different pitch angles of the guide blades. Energomashinostroenie 7 no.6:7-11 Je '61. (MIRA 14:7)

(Gas turbines) (Steam turbines)

KIRILLOV, I.I., doktor tekhn.nauk, prof.

Effect of the shape of the blading of the low pressure end on the efficiency of steam turbines. Energomashinostroenie 7 no.12:1-5 D '61. (MIRA 14:12)

(Steam turbines--Testing)

23554
S/096/61/000/007/001/006
26.2120
E194/E155

AUTHOR: Kirillov, I.I., Doctor of Technical Sciences

TITLE: Changes in the torque of a gas turbine stage as functions of the speed of rotation

PERIODICAL: Teploenergetika, 1961, No.7, pp. 18-24

TEXT: This article considers the characteristics of turbine stages when the inlet and outlet gas conditions are constant. The influence of changes in rate of gas flow and heat drop on the torque can easily be allowed for. The main parameters that determine the torque when the ratio u/C_0 (runner peripheral speed/gas velocity) is small are first considered theoretically. The following expression is derived for the starting torque of the turbine:

$$\mu_H = \chi_H^2 \left(1 + \frac{1}{\overline{c_{u0}}}\right) \quad (6)$$

where: μ_H is the torque when the runner is stationary; $u = 0$; χ_H is the flow factor when $u = 0$; $\overline{c_{u0}}$ is the circulation factor under rated conditions. It is stated that in order to have high torque on starting and at low speeds the stage should

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S/096/61/000/007/001/006
Changes in the torque of a gas E194/E155

have a low value of circulation coefficient $\overline{c_{u0}}$ under designed conditions and a high flow-factor at low speeds. It is most important to choose the right kind of stage for different types of gas turbine if high starting torque is to be obtained without attendant disadvantages. The influence of low circulation-factor on blade design is discussed; it is usually necessary to use blades with large angles of attack and profiles that are not sensitive to differences in the angle of attack. The problem of designing turbines to operate over a wide speed range can be tackled in many different ways and in order to make a correct choice of the type of stage the designer requires access to experimental data on power losses and flow factors for stages of different types. The article then gives test results of this kind for stages of the active and reactive types. Both of the stages tested had relatively long twisted blades. The active stage (A) had a maximum efficiency of 0.60 and reactive stage (R) 0.65. Stage (A) was tested in air in the range of Reynolds numbers $2.9-3.3 \times 10^5$ and stage (R) in the range $2.5-3 \times 10^5$. During the test measurements were made of the running speed, the shaft torque, the air flow, the inlet and discharge air conditions, and
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S/096/61/000/007/001/006
Changes in the torque of a gas E194/E155

the pressures at the blade roots and periphery. The pressure and velocity distributions were also measured, at a distance of 4-5 mm from the discharge edges. Pressures were also measured in various places. Fig.6 shows the relative torque μ and flow factor χ as functions of u/C_0 for stage (A). It will be seen that the torque is 2.4 times the rated value when the runner is stationary. The flow factor rises steadily as the speed is reduced, reaching a value of 1.062 when the runner is stationary. A certain difference between the theoretical and practical values of starting torque was explained by changes in the mean angle of discharge of flow from the runner when stopped as compared with the angle under optimum conditions. Fig.10 shows curves of the torque μ and the flow factor χ as functions of u/C_0 for the reactive stage (R). It will be seen that when the runner is stationary the starting torque is 2.5, which is in good agreement with the value of 2.42 calculated by Eq. (6). With the reactive stage the starting torque was slightly higher than with the active, but the angle of attack at starting was considerably greater though the conditions of flow over the blades were somewhat better. The change of reaction with speed is, of course, quite different in stages (A) and (R).
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S/096/61/000/007/001/006

Changes in the torque of a gas turbine...E194/E155

It is concluded that the static torque depends mainly on the value of the circulation coefficient $\overline{c_{u0}}$ under rated conditions, and on the flow factor χ when $u = 0$. The approximate formula (6) is recommended for calculating starting torque.

There are 10 figures and 2 Soviet references.

ASSOCIATION: Bryanskiy institut transportnogo mashinostroyeniya (Bryansk Institute of Transport Engineering)

Card 4/5

KIRILLOV, I.I., doktor tekhn.nauk; IVANOV, V.A., inzh.

Stability and transient regulation process of turbines with intermediate steam reheating. Teploenergetika 8 no.10:55-60 O '61. (MIRA 14:10)

1. Leningradskiy politekhnicheskiy institut.
(Steam turbines)

KIRILLOV, I.I., doktor tekhn.nauk; TERESHKOV, A.A., inzh.

Turbine stage with flat wall guiding channels. Teploenergetika 8 no.12:45-51 D '61. (MIRA 14:12)

1. Leningradskiy politekhnicheskiy institut.
(Steam turbines--Design and construction)

ZYSIN, Vladimir Aronovich; KIRILLOV, I.I., prof., retsenzent; ERLIKH, V.A., inzh., red.; SOBOLEVA, Ye.M., tekhn. red.

[Composite steam-gas systems and their operating cycles] Kombinirovannye parogazovye ustanovki i tsikly. Moskva, Gosenergoizdat, 1962. 185 p. (MIRA 16:5)
(Thermodynamics) (Electric power plants)
(Heat—Transmission)

37859

S/143/62/000/005/003/003
D238/D308

26.2120

AUTHORS: Kirillov, I.I., Doctor of Technical Sciences, Gogolev, I.G., Dyakonov, R.O., Candidates of Technical Sciences, and Klimtsov, A.A., Engineer

TITLE: The BITM experimental air turbines

PERIODICAL: Izvestiya vysshikh uchebnykh zavedeniy. Energetika, no. 5, 1962, 119 - 122

TEXT: Several plants are available in the BITM for aero-dynamic investigations on steam and gas turbine stage models at low speeds. New experimental plants for high speeds, already operating or in construction, are described. Multiple experimental turbines have been constructed for stages in-line providing tests on either one or two stages. The turbines were designed so as to provide a flexible experimental test rig suitable for various investigations. A second frame was built into the rig for this purpose on which a second working disc could be mounted. In this way both rotors could be connected by a flexible shaft and measurements taken of the total torque, or each disc could be connected with its hydraulic brake and measu-

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red separately. Tests could also be carried out with mutually opposing rotation. The second frame can be set up at different distances from the first, affording tests with different transitions between the stages, with a different stage admission. This is important when investigating the flow after the regulation stage. Investigations can also be carried out on the inlet and outlet nozzles operating simultaneously with the turbine stage. An experimental turbine has been designed also for testing the stages of large steam and gas turbines at high acoustic velocities. The turbine is designed for operating up to 12,000 r.p.m., developing a power of 200 kW. Experience has shown that universal experimental turbines are complicated and expensive in operation. Relatively simple experimental turbines should be fitted up for solving particular problems. Test rigs are recommended affording a number of standard units. There are 5 figures and 2 Soviet-bloc references.

ASSOCIATION: Bryasnkiy institut transportnogo mashinostroyeniya (Bryansk Institute of Transport Machine Construction)

SUBMITTED: September 20, 1960

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S/124/63/000/001/013/080
D234/D308

AUTHORS: Kirillov, I.I. and Kuz'michev, R.V.

TITLE: Energy losses in a turbine stage due to fastening wires

PERIODICAL: Referativnyy zhurnal, Mekhanika, no. 1, 1963, 36, abstract 1B212 (Elektr. stantsii, 1962, no. 7, 38-42)

TEXT: The authors give the results of an experimental investigation of a turbine stage with one, two and three rows of fastening wire on working blades.
[Abstracter's note: Complete translation]

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GALKIN, M.A.; KURBET, S.A.; KIRILLOV, L.I.

Design of machinerv and the cost of its production. Trakt. i sel'-khozmash. 32 no.7:25-27 Jl '62. (MIRA 15:7)
(Agricultural machinery)

KIRILLOV, I.I., doktor tekhn.nauk, prof.; YABLONIK, R.M., kand.tekhn.nauk, dotsent

Effect of supercooling and constitution of wet steam on its expenditure by nozzles. Energomashinostroenie 8 no.10:6-10 O '62. (MIRA 15:11)

(Steam)
(Steam turbines)

KIRILLOV, I. I., doktor tekhn. nauk, prof.; ZYSIN, V. A., kand. tekhn. nauk; OSHEROV, S. Ya., kand. tekhn. nauk

Problem concerning the cooling of a high-temperature gas turbine. Energomashinostroenie 8 no.12:7-10 D '62. (MIRA 16:1)

(Gas turbines--Cooling)

KIRILLOV, I.I., doktor tekhn.nauk; YABLONIK, R.M., kand.tekhn.nauk

Problem of the improving of turbine stages operating with moist steam. Teploenergetika 9 no.10:41-47 O '62. (MIRA 15:9)
(Steam turbines—Design and construction)

VOSHCHANOV, Konstantin Pavlovich; KIRILLOV, Ivan Ivanovich; CHERNYAK, V.S., nauchnyy red.; SAZIKOV, M.I., red.; DORODNOVA, L.A., tekhn.red.

[Machines and apparatuses for the flame machining of metals] Mashiny i apparatura dlia gazoplamennoi obrabotki metallov. Moskva, Proftekhizdat, 1963. 122 p. (MIRA 16:6)

(Gas welding and cutting—Equipment and supplies)

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TITLE: Energy losses in shrouded and unshrouded turbine stages

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TEXT: When peripheral speeds are high it is necessary to determine whether the advantages of shrouding justify the practical difficulties which it introduces. Hence it is necessary to assess accurately the influence of shrouding on stage losses. The old Andersburg and Brown-Boveri formulae are based on reaction stages and so can give false results. More recent work relates to other more appropriate types of stage but the test results are contradictory. Accordingly, tests were made in an experimental turbine using shrouded and unshrouded stages, most of the impulse type, some with twisted blades. Curves are plotted of efficiency as functions of velocity ratio and of radial clearance δ; flow characteristics near the blades were determined. It was found that in unshrouded stages, blade tip losses are little influenced by the amount of reaction at the peripheral section, because increased reaction increases leakage through the radial clearance

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but reduces secondary losses of various kinds and vice versa. Consequently, in such stages losses associated with radial clearance may be significant even when the peripheral section reaction is low. Unshrouded impulse blading with smooth flow path at the periphery has high tip losses if $\bar{\delta} > 0.005$; these losses may be reduced by employing guide vanes with positive peripheral overlap. With the radial clearances normally used, the presence of shrouding significantly improves the efficiency of impulse blading. Moreover, with shrouded blading the radial clearance may be somewhat reduced. Accordingly, shrouding should be used whenever possible. There are 5 figures and 1 table.

ASSOCIATIONS: LPI - BITM